

Section 5.3

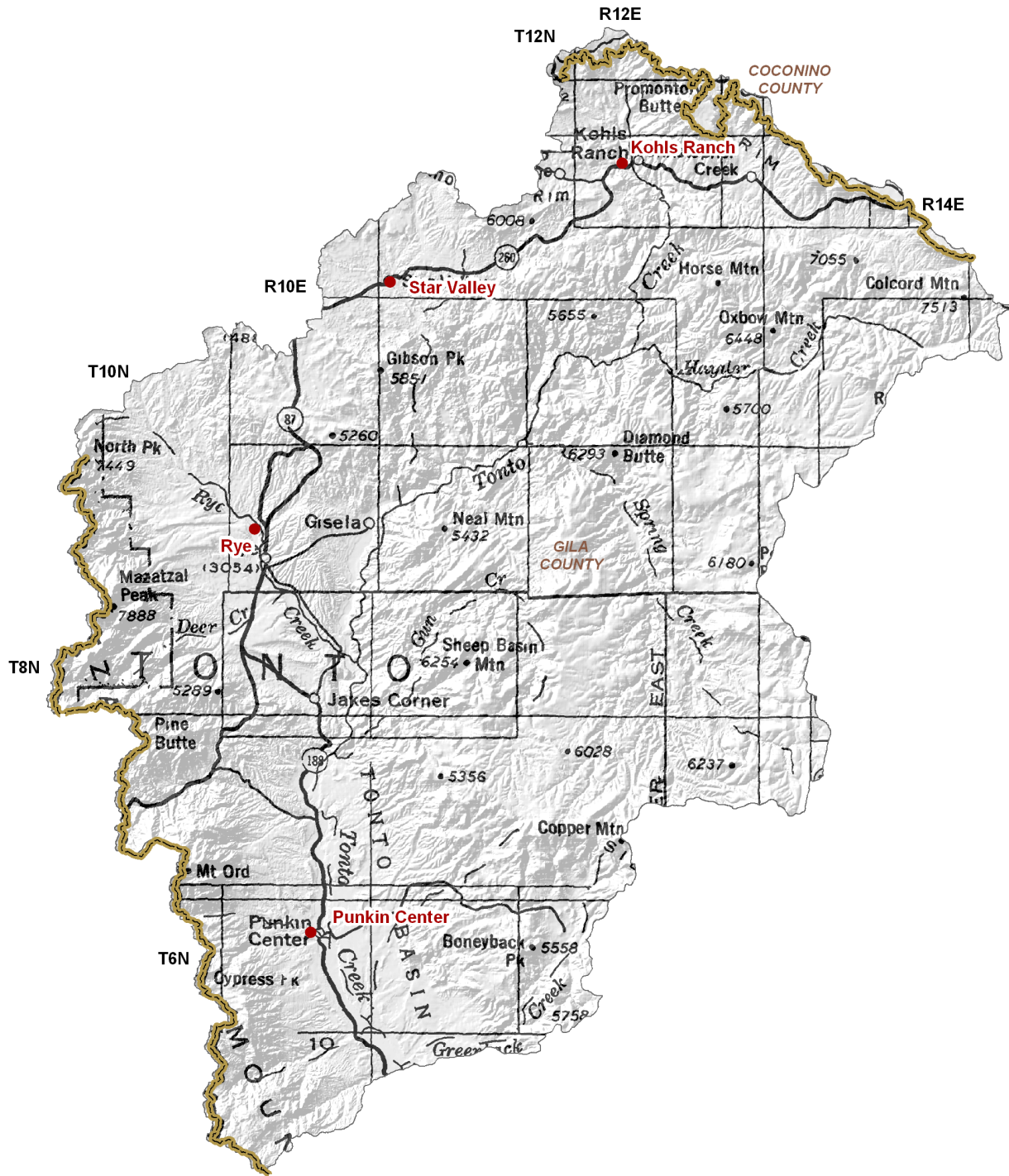
Tonto Creek Basin



5.3.1 Geography of the Tonto Creek Basin

The Tonto Creek Basin, located in the east central part of the planning area is 955 square miles in area. Geographic features and principal communities are shown on Figure 5.3-1. The basin is characterized by mid-elevation mountain ranges. Vegetation types include Sonoran desertscrub, semidesert grassland, chaparral, woodland and montane conifer forests. Riparian vegetation is found along streams including mixed broadleaf, tamarisk and mesquite along Tonto Creek.

- Principal geographic features shown on Figure 5.3-1 are:
 - Basin communities of Punkin Center, Rye, Star Valley and Kohls Ranch
 - Tonto Creek running north to south through the center of the basin from Kohls Ranch and exiting the basin about eight miles south of Punkin Center
 - The lowest point in the basin is about 5,000 feet along Tonto Creek where it exits the basin
 - Rye Creek flowing through Rye in the western portion of the basin
 - Spring Creek and Hayler Creek flowing from the eastern basin boundary to Tonto Creek
 - The Tonto Basin located in the south central part of the basin along Tonto Creek
- Not well shown on Figure 5.3-1 are
 - The Mogollon Rim along the northern basin boundary
 - The Sierra Ancha Mountains along the eastern boundary
 - The Mazatzal Mountains along the western boundary, which contain the highest point in the basin, Mazatzal Peak at 7,888 feet



Base Map: USGS 1:500,000, 1981

0 3 6 Miles



COUNTY
City, Town or Place



Figure 5.3-1
Tonto Creek Basin
Geographic Features

5.3.2 Land Ownership in the Tonto Creek Basin

Land ownership, including the percentage of ownership by category, for the Tonto Creek Basin is shown in Figure 5.3-2. The principal feature of land ownership in this basin is the large amount of forest service land. A description of land ownership data sources and methods is found in Volume 1, Section 1.3.8. Land ownership categories are discussed below in the order of percentage from largest to smallest in the basin.

National Forest and Wilderness

- 97.5% of the land is federally owned and managed as National Forest and Wilderness, the largest percentage of any basin in the planning area.
- Forest lands in the basin are part of the Tonto National Forest.
- The basin contains two wilderness areas, a portion of the 250,053-acre Mazatzal Wilderness and the entire 37,399-acre Hellsgate Wilderness.
- There are numerous small private in-holdings.
- Land uses include recreation, grazing and timber production.

Private

- 2.4% of the land is private.
- Small in-holdings of private land are scattered throughout the basin with a number of larger parcels in the vicinity of Punkin Center and Star Valley.
- Land uses include domestic, commercial and ranching.

Indian Reservation

- 0.1% of the land is under ownership of the Tonto Apache tribe.
- The small portion of tribal land in this basin is located in T10N, R10E.
- Land use includes domestic and ranching.



Source: ALRIS, 2004
Bureau of Land Management, 1999

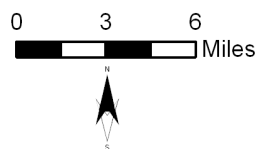


Figure 5.3-2
Tonto Creek Basin
Land Ownership

Land Ownership (Percentage in Basin)	
National Forest & Wilderness (97.5%)	
Private (2.4%)	
Indian Reservation (0.1%)	
COUNTY	
Major Road	
City, Town or Place	

5.3.3 Climate of the Tonto Creek Basin

Climate data from NOAA/NWS Co-op Network and SNOTEL/Snowcourse stations are compiled in Table 5.3-1 and the locations are shown on Figure 5.3-3. Figure 5.3-3 also shows precipitation contour data from the Spatial Climate Analysis Service (SCAS) at Oregon State University. The Tonto Creek Basin does not contain Evaporation Pan or AZMET stations. A description of the climate data sources and methods is found in Volume 1, Section 1.3.3.

NOAA/NWS Co-op Network

- Refer to Table 5.3-1A
- Elevation at the three NOAA/NWS Co-op network stations is similar, ranging from 2,360 feet at Punkin Center to 2,900 feet at Gisela.
- Minimum average temperature ranges from 40.8°F at Gisela to 45.3°F at Punkin Center.
- Maximum average temperatures are also similar and range from 86.8°F at Reno R.S. to 81.9°F at Gisela.
- Station precipitation ranges from 18.23 inches at Punkin Center to 19.77 at Reno R.S.
- The Reno R.S. station reports highest average seasonal rainfall in the fall (October-December) and the other two stations report highest seasonal annual rainfall in the winter (January – March). All three stations report the lowest seasonal rainfall in the spring (April-June).

SNOTEL/Snowcourse

- Refer to table 5.3-1D
- There are two stations in this basin, Promontory Butte and Promontory Pillow (SNOTEL). The Promontory Butte station was discontinued in 1989.
- Both stations are at an elevation of 7,930 feet and record highest average snowpack in April.
- The highest average snowpack at Promontory Butte is 15.1 inches and at Promontory Pillow (SNOTEL) is 14.1 inches. Snowpack is measured in inches of snow water content. Ten inches of fresh snow can contain as little as 0.10 inches of water or up to 4 inches depending on a number of factors. The majority of U.S. snows fall with a water-to-snow ratio of between 0.04 and 0.10. (NSIDC, 2006)

SCAS Precipitation Data

- See Figure 5.3-3
- Additional precipitation data shows rainfall as high as 38 inches on the northern basin boundary at the Mogollon Rim and as low as 14 inches on the southern basin boundary south of Punkin Center.
- In general, precipitation increases as altitude increases in this basin. The range of 24 inches between areas of highest and lowest precipitation is common for the planning area.

Table 5.3-1 Climate Data for the Tonto Creek Basin

A. NOAA/NWS Co-op Network:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Temperature Range (in F)		Average Total Precipitation (in inches)				
			Max/Month	Min/Month	Winter	Spring	Summer	Fall	Annual
Gisela	2,900	1895-2004 ¹	81.9/Jul	40.8/Dec	6.53	1.39	6.10	4.89	18.91
Reno R.S.	2,420	1915-1973 ¹	86.8/Jul	45.1/Jan	3.51	1.05	6.58	8.61	19.77
Punkin Center	2,360	1971-2000	85.9/Jul	45.3/Dec	6.92	1.23	4.83	5.24	18.23

Source: WRCC, 2003.

Notes:

¹ Average temperature for period of record shown; average precipitation from 1971-2000

B. Evaporation Pan:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Avg. Annual Evap (in inches)
None			

Source: WRCC, 2003.

C. AZMET:

Station Name	Elevation (in feet)	Period of Record	Average Annual Reference Evapotranspiration, in inches (Number of years to calculate averages)
None			

Source: Arizona Meteorological Network, 2005

D. SNOTEL/Snowcourse:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Snowpack, at Beginning of the Month, as Inches Snow Water Content (Number of measurements to calculate average)					
			Jan.	Feb.	March	April	May	June
Promontory Butte	7,930	1973 - 1989 (discontinued)	4.2(10)	8.4(13)	13.7(16)	15.1(15)	11.3(1)	0(0)
Promontory SNOTEL	7,930	1973 - current	3.9(25)	8.1(28)	13.7(31)	14.1(30)	2.3(22)	0(21)

Source: NRCS, 2005

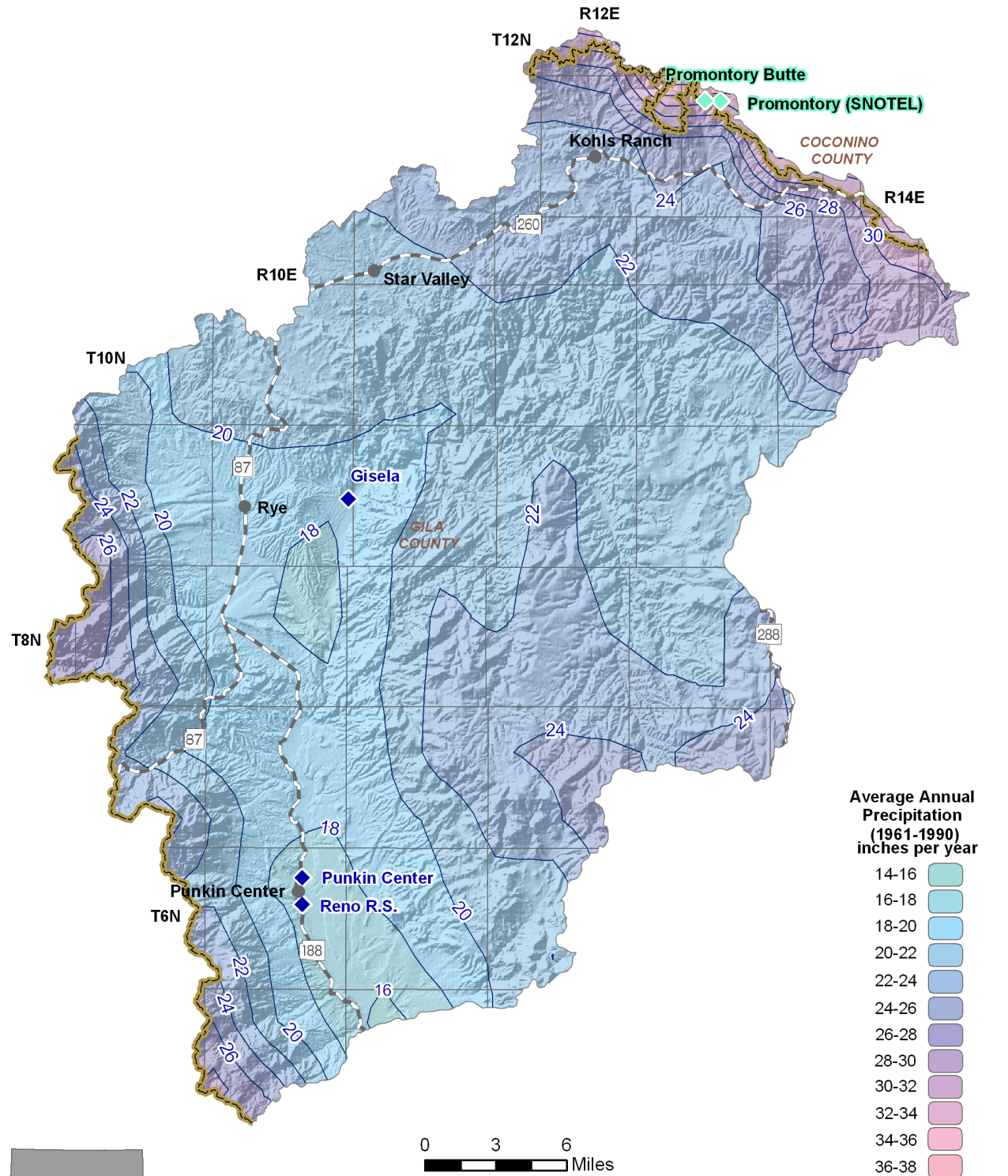
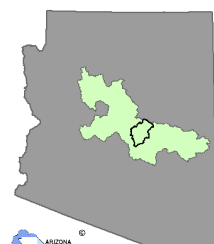


Figure 5.3-3
Tonto Creek Basin
Meteorological Stations
and Annual Precipitation



Precipitation Data Source: Oregon State University, 1998

5.3.4 Surface Water Conditions in the Tonto Creek Basin

Streamflow data, including average seasonal flow, average annual flow and other information is shown in Table 5.3-2. Flood ALERT equipment in the basin is shown in Table 5.3-3. Reservoir and stockpond data, including maximum storage or maximum surface area, are shown in Table 5.3-4. The location of streamflow gages identified by USGS number, flood ALERT equipment and USGS runoff contours are shown on Figure 5.3-4. A description of stream data sources and methods is found in Volume 1, Section 1.3.16. A description of reservoir data sources and methods is found in Volume 1, Section 1.3.11. A description of stockpond data sources and methods is found in Volume 1, Section 1.3.15.

Streamflow Data

- Refer to Table 5.3-2.
- Data from four stations located on Tonto Creek and Rye Creek are shown in the table and on Figure 5.3-4. Three of the four stations have been discontinued. The fourth station, Tonto Creek above Gun Creek near Roosevelt, is a real-time station.
- The average seasonal flow at all stations is highest in the winter (January-March) when between 43% and 65% of the average annual flow occurs. The average seasonal flow is lowest at all stations in the summer (July-September) when between 7% and 10% of the average annual flow occurs.
- Maximum annual flows range from 469,256 acre-feet (1978, Tonto Creek above Gun Creek near Roosevelt) to 64,289 acre-feet (1978, Rye Creek near Gisela). Minimum annual flows range from 1,245 acre-feet (1971, Rye Creek near Gisela) to 32,796 acre-feet (1974, Tonto Creek near Gisela).
- Both gaged streams in this basin have a mean annual flow of over 10,000 acre-feet. Tonto Creek has a recorded mean annual flow of over 100,000 acre-feet.

Flood ALERT Equipment

- Refer to Table 5.3-3.
- As of October 2005, there were nine stations in the basin. All stations are in Gila County, however, one station is operated by the Maricopa County Flood Control District. The remaining stations are operated by the Gila County Flood Control District.
- Of the nine stations, six are precipitation only stations, two are precipitation/stage stations and one is a repeater/precipitation station.

Reservoirs and Stockponds

- Refer to Table 5.3-4.
- The basin does not contain any large reservoirs.
- Surface water is stored or could be stored in one small reservoir in the basin. This reservoir has a maximum storage of 20 acre-feet.
- There are 389 registered stockponds in this basin.

Runoff Contour

- Refer to Figure 5.3-4.
- Average annual runoff is two inches per year in the southern tip of the basin and increases to five inches per year in the northern portion of the basin.

Table 5.3-2 Streamflow Data for the Tonto Creek Basin

Station Number	USGS Station Name	Drainage Area (in mi ²)	Mean Basin Elevation (in feet)	Period of Record	Average Seasonal Flow (% of annual flow)				Annual Flow (in acre-feet/year)				Years of Record
					Winter	Spring	Summer	Fall	Minimum	Median	Mean	Maximum	
9498800	Tonto Creek near Gisela	430	5,810	12/1964-9/1975 (discontinued)	43	15	8	33	32,796 (1974)	68,705	93,147	236,741 (1965)	10
9498870	Rye Creek near Gisela	122	4,390	12/1965-9/1985 (discontinued)	65	10	7	18	1,245 (1971)	9,267	19,030	64,289 (1978)	19
9499000	Tonto Creek above Gun Creek near Roosevelt	675	5,020	12/1940-current (real-time)	61	12	8	19	2,853 (2002)	66,297	113,232	469,256 (1978)	62
9499500	Tonto Creek near Roosevelt	841	NA	10/1913-12/1940 (discontinued)	59	17	10	15	17,452 (1934)	89,796	104,292	225,214 (1916)	27

Sources: USGS NWIS, USGS 1998 and USGS 2003.

Notes:

Statistics based on Calendar Year
Annual Flow statistics based on monthly values
Summation of Average Annual Flows may not equal 100 due to rounding.
Period of record may not equal Year of Record used for annual Flow/Year statistics due to only using years with a 12 month record
NA = Data not currently available to ADWR

Table 5.3-3 Flood ALERT Equipment in the Tonto Creek Basin

Station ID	Station Name	Station Type	Install Date	Responsibility
51	Upper Deer Creek	Precipitation	NA	Gila County FCD
54	Christopher Creek	Precipitation	5/1/2005	Gila County FCD
67	Rock Creek (Rye Tributary)	Precipitation	NA	Gila County FCD
80	Hardt Creek @ SR 87	Precipitation/Stage	NA	Gila County FCD
92	Little Pine Flat	Precipitation	8/29/2005	Gila County FCD
930	Deer Creek Shake Ridge (Bar T Bar North)	Precipitation	NA	Gila County FCD
931	Upper Rye Creek	Precipitation	NA	Gila County FCD
3900	Houston Creek	Precipitation/Stage	10/26/2005	Gila County FCD
5960	Mt. Ord Repeater	Repeater/Precipitation	10/28/1982	Maricopa County FCD

FCD = Flood Control District

NA = Data not currently available to ADWR

Table 5.3-4 Reservoirs and Stockponds in the Tonto Creek Basin

A. Large Reservoirs (500 acre-feet capacity and greater)

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM STORAGE (AF)	USE	JURISDICTION
None identified by ADWR at this time					

B. Other Large Reservoirs (50 acre surface area or greater)

MAP KEY	RESERVOIR/LAKE NAME (Name of dam, if different)	OWNER/OPERATOR	MAXIMUM SURFACE AREA (acres)	USE	JURISDICTION
None identified by ADWR at this time					

C. Small Reservoirs (greater than 15 acre-feet and less than 500 acre-feet capacity)

Total number: 1

Total maximum storage: 20 acre-feet

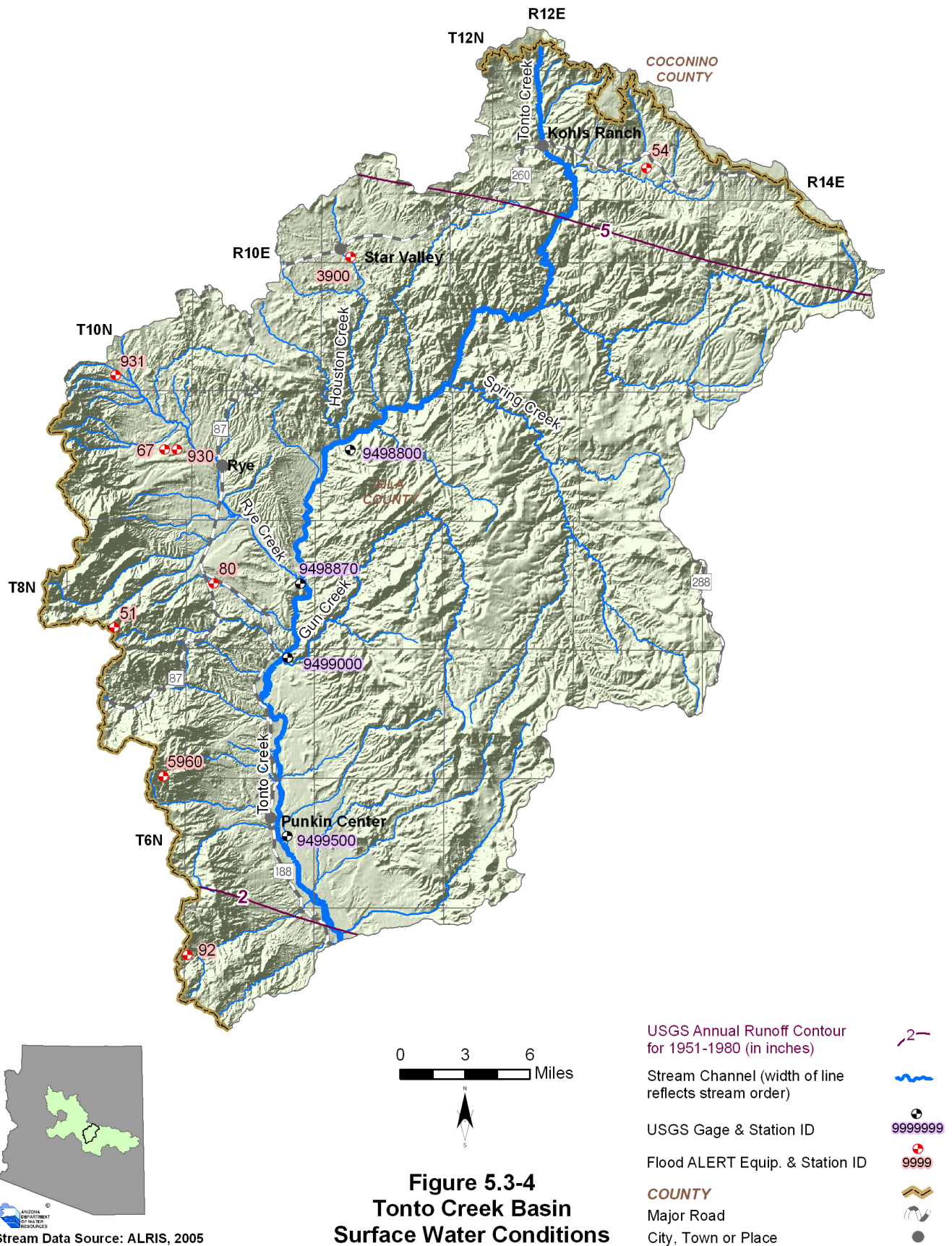
D. Other Small Reservoirs (between 5 and 50 acres surface area)

Total number: 0

Total surface area: 0 acres

E. Stockponds (up to 15 acre-feet capacity)

Total number: 389 (from water right filings)



5.3.5 Perennial/Intermittent Streams and Major Springs in the Tonto Creek Basin

Major and minor springs with discharge rates and date of measurement, and the total number of springs in the basin are shown in Table 5.3-5. The locations of major springs and perennial and intermittent streams are shown on Figure 5.3-5. A description of data sources and methods for intermittent and perennial reaches is found in Volume 1, 1.3.16. A description of spring data sources and methods is found in Volume 1, Section 1.3.14.

- Perennial streams in this basin include Tonto Creek, Haigler Creek, Spring Creek, Dell Shay Creek, Houston Creek, Christopher Creek and Greenback Creek.
- There are numerous intermittent streams located throughout the basin.
- Tonto Creek is the longest continuously perennial stream in the basin. Most other perennial streams also contain intermittent reaches.
- There are 10 major springs with a measured discharge of 10 gallons per minute (gpm) or greater at any time.
- Listed discharge rates may not be indicative of current conditions. Only four of the ten springs have measured discharges in the past decade.
- All springs are found in the vicinity of Kohls Ranch in the northern portion of the basin below the Mogollon Rim. The greatest discharge rate was measured near the Gila and Coconino County boundary (Tonto, 1,291 gpm).
- Three of the major springs have measured discharge rates of 100 gpm or greater.
- Springs with measured discharge of 1 to 10 gpm are not mapped but coordinates are given in Table 5.3-5B. There are seven minor springs identified in this basin.
- The total number of springs, regardless of discharge, identified by the USGS varies from 169 to 175, depending on the database reference.

Table 5.3-5 Springs in the Tonto Creek Basin

A. Major Springs (10 gpm or greater):

Map Key	Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
		Latitude	Longitude		
1	Tonto	342312	1110541	1,291	During or prior to 2001
2	R-C	341827	1110311	800	5/14/1952
3	Horton	342217	1110333	392	10/2/2002
4	See	342108	1110039	84	During or prior to 2002
5	Nappa	342118	1110111	70	8/17/1966
6	Henturkey ²	342037	1110541	60	10/17/1952
7	Wildcat/Arsenic	341726	1111031	59	10/20/1952
8	Indian Gardens	341926	1110610	26	During or prior to 2002
9	Winters # 3	342235	1110633	20	5/16/1952
10	Unnamed ²	342043	1110054	15	8/17/1966

B. Minor Springs (1 to 10 gpm):

Name	Location		Discharge (in gpm) ¹	Date Discharge Measured
	Latitude	Longitude		
Bootleg	341852	1110358	8	During or prior to 2001
Allenbaugh	341620	1105353	8 ³	4/19/2001
Turkey-south	341356	1111752	5 ⁴	5/14/1952
Blue-south	341007	1111943	4	5/14/1952
Bear Flat/ Columbine	341716	1110357	4	7/16/1975
Winters # 1	342233	1110634	1	5/16/1952
Winters # 2	342233	1110634	1	During or prior to 1952

**C. Total number of springs, regardless of discharge, identified by USGS
(see ALRIS, 2005 and NHD, 2006):** 169 to 175

Notes:

¹Most recent measurement identified by ADWR

²Spring is not displayed on current USGS topo maps

³Most recent measurement < 1gpm

⁴Average gpm



0 3 6
Miles



Figure 5.3-5
Tonto Creek Basin
Perennial/Intermittent Streams
and Major (>10 gpm) Springs

- Springs
- Intermittent Streams
- Perennial Streams
- COUNTY
- Major Road
- City, Town or Place



Stream Data Source: AGFD, 1993 & 1997

5.3.6 Groundwater Conditions of the Tonto Creek Basin

Major aquifers, well yields, estimated natural recharge, estimated water in storage, number of index wells and date of last water-level sweep are shown in Table 5.3-6. Figure 5.3-6 shows aquifer flow direction and water-level change between 1990-1991 and 2003-2004. Figure 5.3-7 contains hydrographs for selected wells shown on Figure 5.3-6. Figure 5.3-8 shows well yields in five yield categories. A description of aquifer data sources and methods is found in Volume 1, Section 1.3.2. A description of well data sources and methods, including water-level changes and well yields, is found in Volume 1, Section 1.3.19.

Major Aquifers

- Refer to Table 5.3-6 and Figure 5.3-6.
- The major aquifers in the basin are basin fill and sedimentary rock (C and R aquifers).
- Most of the basin geology consists of consolidated crystalline and sedimentary rocks.
- Flow direction is generally from the north to the south.

Well Yields

- Refer to Table 5.3-6 and Figure 5.3-8.
- As shown on Figure 5.3-8, well yields in this basin range from less than 100 gallons per minute (gpm) to greater than 2,000 gpm.
- One source of well yield information, based on 51 reported wells, indicates that the median well yield in this basin is 120 gpm.
- The highest well yields in the basin are located along Highway 188 north of Punkin Center.

Natural Recharge

- Refer to Table 5.3-6.
- There are two estimates of natural recharge for this basin ranging from 17,000 acre-feet per year to 37,000 acre-feet per year.

Water in Storage

- Refer to Table 5.3-6.
- There are three estimates of water in storage for this basin ranging from two million acre-feet to 9.4 million acre-feet. The most recent estimate, from a 1994 ADWR study, is three million acre-feet in storage to a depth of 1,200 feet.
- The predevelopment storage estimate is two million acre-feet to a depth of 1,200 feet.

Water Level

- Refer to Figure 5.3-6. Water levels are shown for wells measured in 2003-2004.
- The Department annually measures 11 index wells in this basin.
- In 1975, the year of the last water level sweep, 42 wells were measured.
- There is one ADWR automated water-level recording device in this basin located near Star Valley.
- The deepest recorded water level in the basin is 106 feet east of Kohls Ranch and the

shallowest is 14 feet near Punkin Center.

- Hydrographs corresponding to selected wells shown on Figure 5.3-6 but covering a longer time period are shown in Figure 5.3-7.

Table 5.3-6 Groundwater Data for the Tonto Creek Basin

Basin Area, in square miles: 955		
Major Aquifer(s):	Name and/or Geologic Units	
	Basin Fill	
	Sedimentary Rock (C and R Aquifers)	
Well Yields, in gal/min:	N/A	Measured by ADWR and/or USGS
	Range 5-2,200 Median 120 (51 wells reported)	Reported on registration forms for large (> 10-inch) diameter wells
	Range 10-50	ADWR (1990)
	Range 0-500	USGS (1994)
Estimated Natural Recharge, in acre-feet/year:	17,000	ADWR (1994)
	37,000	Freethy and Anderson (1986)
Estimated Water Currently in Storage, in acre-feet:	3,000,000 (to 1,200 feet)	ADWR (1994)
	9,400,000 (to 1,200 feet)	ADWR (1992)
	2,000,000 ¹ (to 1,200 feet)	Freethy and Anderson (1986)
	N/A	Arizona Water Commission (1975)
Current Number of Index Wells: 11		
Date of Last Water-level Sweep: 1975 (42 wells measured)		

¹ Predevelopment Estimate

N/A = not available

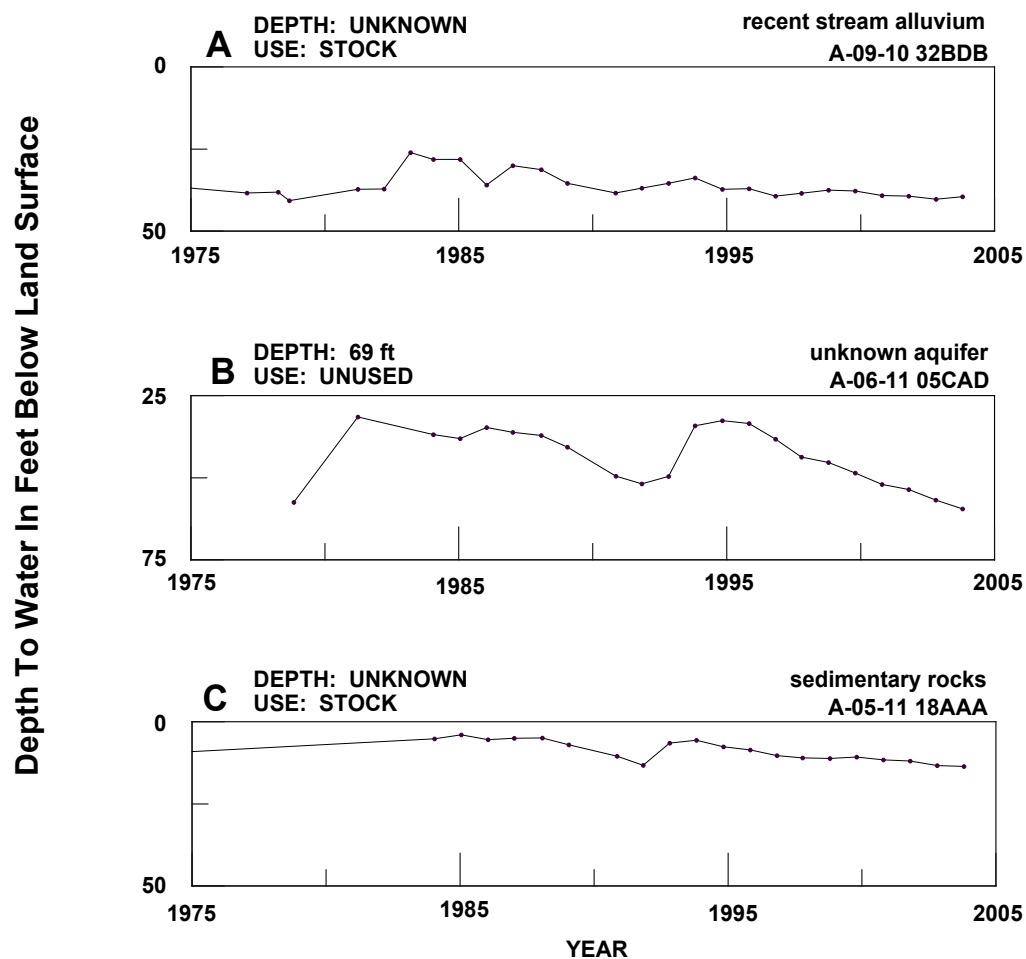


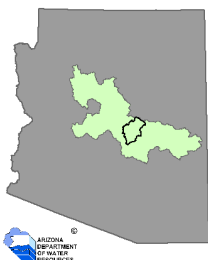
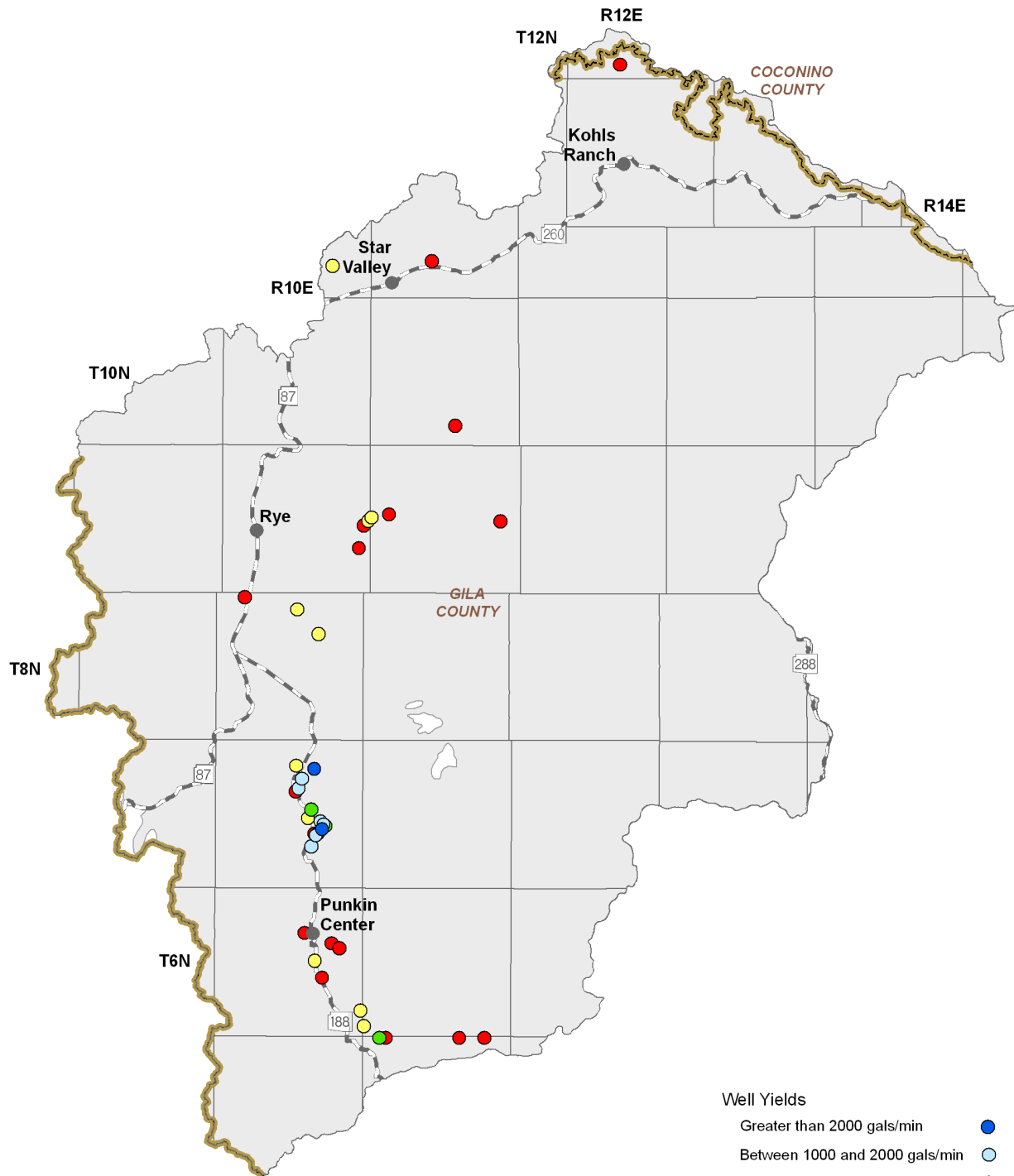
0 3 6 Miles



**Figure 5.3-6
Tonto Creek Basin
Groundwater Conditions**

Figure 5.3-7
Tonto Creek Basin
Hydrographs Showing Depth to Water in Selected Wells





0 3 6
Miles

Figure 5.3-8
Tonto Creek Basin
Well Yields

Well Yields

- Greater than 2000 gals/min
- Between 1000 and 2000 gals/min
- Between 500 and 1000 gals/min
- Between 100 and 500 gals/min
- Less than 100 gals/min

Consolidated Crystalline
& Sedimentary Rocks

Unconsolidated Sediments

COUNTY

Major Road

City, Town or Place



5.3.7 Water Quality of the Tonto Creek Basin

Wells, springs and mine sites with parameter concentrations that have equaled or exceeded drinking water standard(s), including location and parameter(s) are shown in Table 5.3-7A. Impaired lakes and streams with site type, name, length of impaired reach, area of impaired lake, designated use standard and parameter(s) exceeded is shown in Table 5.3-7B. Figure 5.3-9 shows the location of water quality occurrences keyed to Table 5.3-7. A description of water quality data sources and methods is found in Volume 1, Section 1.3.18. Not all parameters were measured at all sites; selective sampling for particular constituents is common.

Wells, Springs and Mines

- Refer to Table 5.3-7A.
- Nine sites have parameter concentrations that have equaled or exceeded drinking water standards
- Standards equalled or exceeded in this basin include arsenic, nitrate/nitrite, beryllium, radionuclides and organic compounds or pesticides.

Lakes and Streams

- Refer to Table 5.3-7B.
- Water quality standards were exceeded in three stream reaches on two streams.
- The standard exceeded in all reaches was E. coli. The two reaches on Tonto Creek also exceeded the standard for nitrates/nitrites.
- All three impaired reaches are part of the ADEQ water quality improvement effort called the Total Maximum Daily Load (TMDL) program. The final TMDL reports for the streams have been completed.

Table 5.3-7 Water Quality Exceedences in the Tonto Creek Basin¹

A. Wells, Springs and Mines

Map Key	Site Type	Site Location			Parameter(s) Concentration has Equaled or Exceeded Drinking Water Standard (DWS) ²
		Township	Range	Section	
1	Well	11 North	12 East	34	Rad
2	Well	9 North	10 East	25	As
3	Well	9 North	11 East	18	Rad
4	Well	9 North	12 East	23	As, NO3
5	Well	8 North	10 East	13	NO3
6	Well	8 North	10 East	26	Be
7	Well	8 North	10 East	26	As
8	Well	8 North	10 East	27	As
9	Well	5 North	11 East	8	Organics

B. Lakes and Streams

Map Key	Site Type	Site Name	Length of Impaired Stream Reach (in miles)	Area of Impaired Lake (in acres)	Designated Use Standard ³	Parameter(s) Exceeding Use Standard ²
a	Stream	Christopher Creek (headwaters to Tonto Creek)	8	NA	FBC	E. coli
b	Stream	Tonto Creek (headwaters to unnamed tributary latitude 341810, longitude 1110414)	8	NA	A&W, FBC	E. coli, NO3
c	Stream	Tonto Creek (unnamed tributary latitude 341810, longitude 1110414 to Haigler Creek)	9	NA	A&W, FBC	E. coli, NO3

¹ Water quality samples taken from 1979 to 2002

²As = Arsenic

Be = Beryllium

NO3 = Nitrate/Nitrite

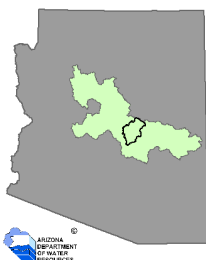
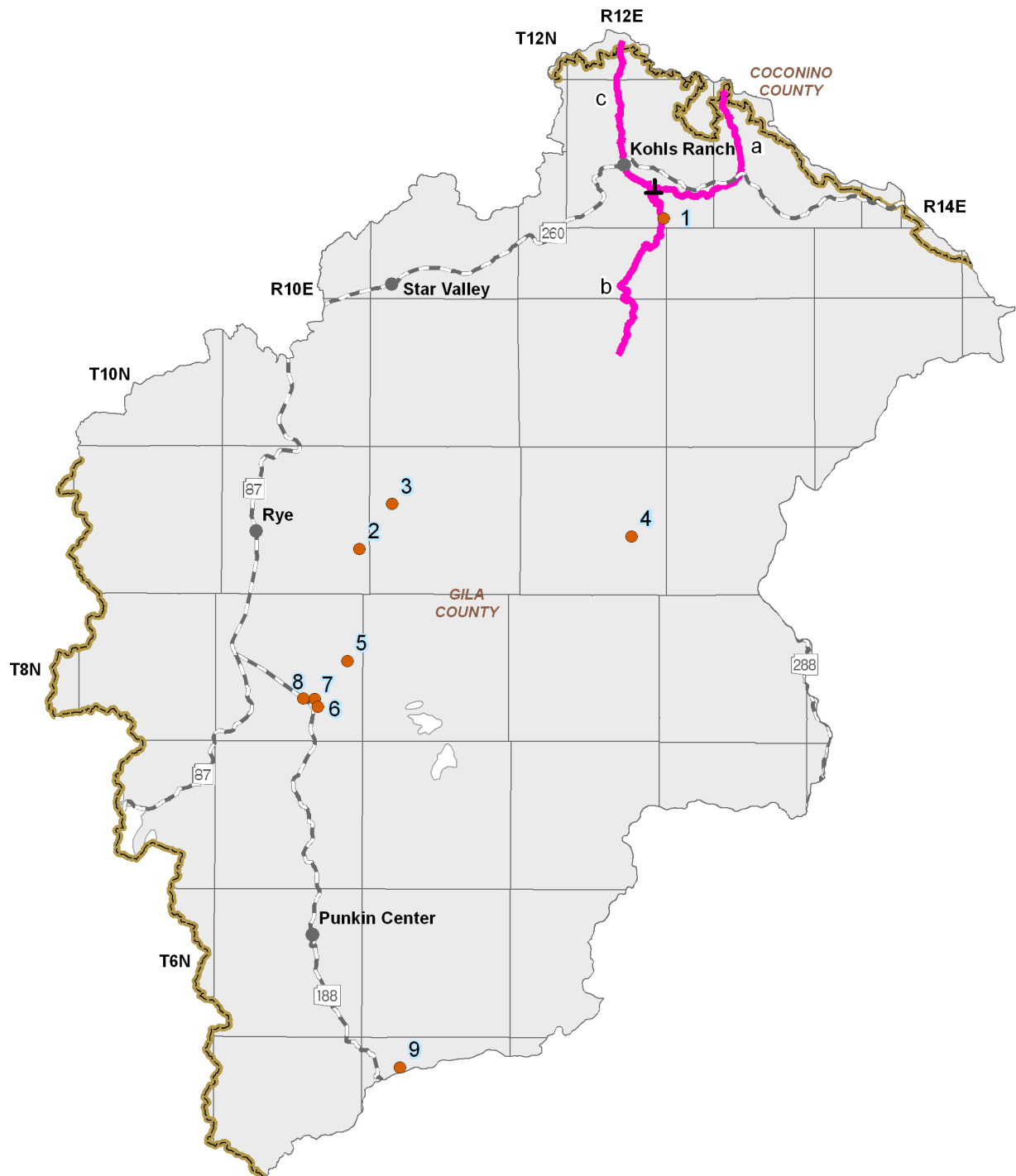
Organics = One or more of several volatile and semi-volatile organic compounds and pesticides

Rad = One or more of the following radionuclides - Gross Alpha, Gross Beta, Radium, and Uranium

³ A&W = Aquatic and Wildlife

FBC = Full Body Contact

NA = Not Available

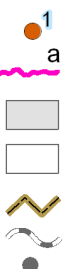


0 3 6
Miles



Figure 5.3-9
Tonto Creek Basin
Water Quality Conditions

- Well, Spring or Mine Site that has Equaled or Exceeded DWS
- Impaired Stream or Lake
- Consolidated Crystalline & Sedimentary Rocks
- Unconsolidated Sediments
- COUNTY**
- Major Road
- City, Town or Place



5.3.8 Cultural Water Demands in the Tonto Creek Basin

Cultural water demand data including population, number of wells and the average well pumpage and surface water diversions by the municipal, industrial and agricultural sectors are shown in Table 5.3-8. Effluent generation including facility ownership, location, population served and not served, volume treated, disposal method and treatment level is shown in Table 5.3-9. Figure 5.3-10 shows the location of demand centers. A description of cultural water demand data sources and methods is found in Volume 1, Section 1.3.5. More detailed information on cultural water demands is found in Section 5.0.7.

Cultural Water Demands

- Refer to Table 5.3-8 and Figure 5.3-10.
- Population in this basin has increased from 1,934 in 1980 to 7,537 in 2000. Projections suggest the population will double by 2050 to 16,377.
- Groundwater use has fluctuated from a low of 2,000 acre-feet per year in the 1970s to an average of 4,000 acre-feet per year from 1986-1990. During 2001-2003 the average annual groundwater demand was 3,400 acre-feet per year.
- Municipal groundwater use has increased from an average of 1,600 acre-feet per year in 1991-1995 to 2,200 acre-feet per year in 2001-2003.
- There was no reported industrial groundwater use in 1991. In 2001-2003, industrial demand was 200 acre-feet per year on average.
- Groundwater demand for irrigation was less than 1,000 acre-feet per year on average from 1991-2003.
- Information on surface water diversions is not available from 1971-1990. From 1991-2003, 1,000 acre-feet per year on average was used for irrigation.
- Municipal and industrial demand is principally found in the vicinity of Payson and Star Valley with smaller demand centers scattered along State Highways 188 and 260 as well as east of Rye.
- A small amount of agriculture is located east of Rye and in T9N, R10E.
- There is one small mine or quarry in this basin along Highway 87 south of Payson.
- As of 2003 there were 1,916 registered wells with a pumping capacity of less than or equal to 35 gallons per minute and 93 wells with a pumping capacity of more than 35 gallons per minute.

Effluent Generation

- Refer to Table 5.3-9.
- There is one wastewater treatment facility in this basin. It is a private facility serving the Hunter Creek development near Kohl's Ranch.

Table 5.3-8 Cultural Water Demands in the Tonto Creek Basin¹

Year	Recent (Census) and Projected (DES) Population	Number of Registered Water Supply Wells Drilled		Average Annual Demand (in acre-feet)						Data Source
				Well Pumpage			Surface-Water Diversions			
		Q ≤ 35 gpm	Q > 35 gpm	Municipal	Industrial	Irrigation	Municipal	Industrial	Irrigation	
1971		822 ²	75 ²	2,000			NR			ADWR (1994)
1972										
1973				2,000			NR			
1974										
1975				2,000			NR			
1976										
1977				2,000			NR			
1978										
1979		259	11	3,000			NR			
1980	1,934									
1981	2,202			3,000			NR			
1982	2,470									
1983	2,738			3,000			NR			
1984	3,006									
1985	3,275	280	3	4,000			NR			
1986	3,543									
1987	3,811			4,000			NR			
1988	4,079									
1989	4,347			4,000			NR			
1990	4,615									
1991	4,907	187	2	1,600	NR	<1000	NR	NR	1,000	USGS (2005) ADWR (2005) ADWR (1992)
1992	5,200									
1993	5,492									
1994	5,784									
1995	6,076	289	1	1,900	200	<1000	NR	NR	1,000	
1996	6,368									
1997	6,660									
1998	6,953									
1999	7,245	79	1	2,200	200	<1000	NR	NR	1,000	
2000	7,537									
2001	7,753									
2002	7,968									
2003	8,184									
2010	9,693									
2020	11,844									
2030	13,810									
2040	15,136									
2050	16,377									

ADDITIONAL WELLS:³

WELL TOTALS: 1,916 93

Notes:

NR - Not reported

¹ Does not include evaporation losses from stockponds and reservoirs.

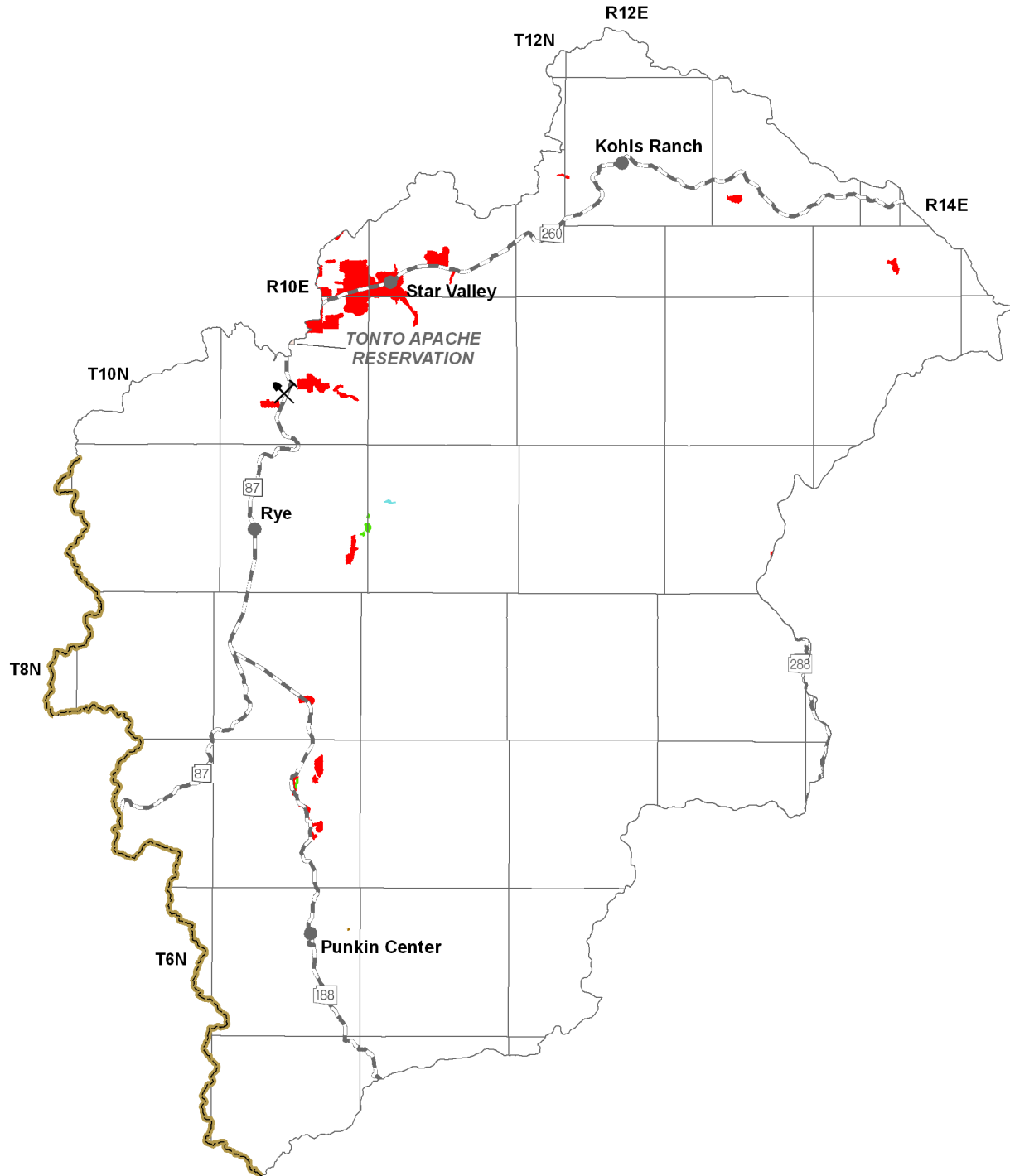
² Includes all wells through 1980.

³ Other water-supply wells are listed in the ADWR Well Registry for this basin, but they do not have completion dates. These wells are summed here.

Table 5.3-9 Effluent Generation in the Tonto Creek Basin

Facility Name	Ownership	City/Location Served	Population Served	Volume Treated/Generated (acre-feet)	Disposal Method						Current Treatment Level	Population Not Served	Year of Record	
					Water-course	Evaporation Pond	Irrigation	Golf Course	Wildlife Area	Discharge to another Facility				Infiltration Basin
Hunter Creek WWTP	Private	Hunter Creek												
NA														

NA: Data not currently available to ADWR
WWTP: Waste Water Treatment Plant



Primary Data Source: USGS National
Gap Analysis Program, 2004

Figure 5.3-10
Tonto Creek Basin
Cultural Water Demand

5.3.9 Water Adequacy Determinations in the Tonto Creek Basin

Water adequacy determination information including the subdivision name, location, number of lots, adequacy determination, reason for the inadequacy determination, date of determination and subdivision water provider are shown in Table 5.3-10. Figure 5.3-11 shows the locations of subdivisions keyed to the Table. A description of the Water Adequacy Program is found in Volume 1, Appendix A. Adequacy determination data sources and methods are found in Volume 1, Sections 1.3.1.

Water Adequacy Reports

- A total of 54 water adequacy determinations have been made in this basin through May, 2005.
- The most common reason for an inadequate determination was because the applicant did not submit the necessary information and/or available hydrologic data were insufficient to make a determination.
- Other reasons for an inadequacy determination included: the existing supply was unreliable or physically unavailable or groundwater exceeds the depth-to-water criteria; the applicant failed to demonstrate a legal right to use the water or failed to demonstrate their legal authority to serve the subdivision; and water quality. For one subdivision the reason for the inadequacy determination is unknown because the records could not be located.
- All water adequacy determinations are in Gila County. Of the 3,676 lots in 51 subdivisions for which lot information was available, 352 lots or less than 10% were determined to be adequate.

Table 5.3-10. Adequacy Determinations in the Tonto Creek Basin¹

Map Key	Subdivision Name	County	Location		No. of Lots	ADWR File No. ²	ADWR Adequacy Determination	Reason(s) for Inadequacy Determination ³	Date of Determination	Water Provider at the Time of Application
			Township	Range	Section					
1	Alpine Heights	Gila	11 North	10	26, 27, 34, 35		Inadequate	A1, A2	07/11/78	United Utilities Company
2	Boulder Creek	Gila	10 North	10	11	22-401552	Inadequate	A1	11/18/04	Town of Payson
3	Chaparral Lakes	Gila	11 North	10	35	22-400536	Inadequate	A1	06/29/01	Town of Payson
4	Chaparral Pines # 1	Gila	11 North	10	25, 35, 36	22-300080	Inadequate	A1, A2	12/18/95	Town of Payson
5	Chaparral Pines # 2	Gila	11 North	10	25, 35, 36	22-300281	Inadequate	A1	04/03/97	Town of Payson
6	Chaparral Ranch	Gila	11 North	10	25, 36		Inadequate	A2, C	02/23/95	Town of Payson
7	Collins Ranch	Gila	11.5 North	11.5	32		Inadequate	A1	01/15/80	Dry Lot Subdivision
8	Deer Creek Village	Gila	8 North	10	5		Inadequate	A1, A2	04/09/82	
9	Elk Ridge	Gila	10 North	10	10	22-300056	Inadequate	A2, C	10/05/95	Town of Payson
10	Evergreen Meadows	Gila	10 North	11	5, 8		Inadequate	B	08/11/75	Dry Lot Subdivision
11	Foothills East	Gila	11 North	10	35	22-300599	Inadequate	A1	10/19/98	Town of Payson
12	Gisela Heights	Gila	9 North	10	24, 25		Adequate		03/30/77	Gisela Water Company
13	Golden Frontier # 1	Gila	10 North	10	10		Inadequate	A1, A2	01/17/80	United Utilities Company
14	Golden Frontier # 2	Gila	10 North	10	10		Inadequate	A1, A2	08/15/84	Town of Payson
15	Gordon Canyon Creek	Gila	10.5 North	14	20		Inadequate	A1, A2	08/10/76	Dry Lot Subdivision
			11 North	13	36					
16	Granite Dells Estates	Gila	10 North	10	2, 11		Inadequate	A1, A2	01/19/77	Dry Lot Subdivision
17	Greenback Vista Estates	Gila	6 North	10	14	22-300392	Adequate		02/03/98	United Utilities Company
18	Haigler Creek Haciendas	Gila	10 North	13	13	NA	Inadequate	A1, B	04/11/83	Dry Lot Subdivision
19	Highlands at the Rim	Gila	10 North	10	2		Inadequate	A1	02/12/02	Town of Payson
20	Houston Creek Landing	Gila	11 North	11	32	22-400372	Inadequate	A1	08/25/00	Brooke Utilities
21	Hunter Creek Ranch	Gila	11 North	13	29, 30, 31, 32		Adequate		02/27/90	Hunter Creek Ranch Homeowners Association
22	Juniper Ridge	Gila	11 North	10	26	22-400015	Inadequate	A1	02/09/99	Town of Payson
23	Knolls # 1	Gila	11 North	11	31		Inadequate	A1, A2	08/24/93	United Utilities, Inc.
24	Knolls # 2	Gila	11 North	11	31		Inadequate	A1, A2	03/28/94	United Utilities, Inc.
25	Knolls # 3	Gila	11 North	11	31	22-300048	Inadequate	A2	09/19/95	United Utilities, Inc.
26	Kohl's Ranch	Gila	11 North	12	21	22-300010	Inadequate	A1, A2	05/16/95	Kohl's Ranch Water Company
27	Kohl's Tonto Creek Ranch	Gila	11 North	12	21		Adequate		07/08/77	Kohl's Ranch Water Company
28	Oak Ridge Hills	Gila	11 North	10	26	22-300168	Inadequate	A2	07/01/96	Town of Payson
29	Pine Gate	Gila	11 North	10	36	22-300435	Inadequate	A1	04/21/98	Town of Payson
30	Pine Island at Chaparral Pines	Gila	11 North	10	36	22-300081	Inadequate	A1, A2	12/14/96	Town of Payson

Table 5.3-10. Adequacy Determinations in the Tonto Creek Basin (cont'd)¹

Map Key	Subdivision Name	County	Location		No. of Lots	ADWR File No. ²	ADWR Adequacy Determination	Reason(s) for Inadequacy Determination ³	Date of Determination	Water Provider at the Time of Application
			Township	Range Section						
31	Pine Ridge	Gila	11 North	11	32	22-300600	Inadequate	A1	02/02/99	Brooke Utilities
32	Pinon Ridge #1	Gila	10 North	10	10	22-300286	Inadequate	A1	05/14/97	Town of Payson
33	Pinon Ridge Unit Two	Gila	10 North	10	10	22-300433	Inadequate	A1	03/20/98	Town of Payson
34	Pondrosa Springs (Colcord Sps)	Gila	10.5 North	14	26, 27, 34, 35		Adequate		01/02/80	Dry Lot Subdivision
35	Preserve, on Haigler Creek	Gila	10 North	13	13		Inadequate	A1	01/13/86	Dry Lot Subdivision
36	Punkin Center Village	Gila	6 North	10	13, 14	NA	Inadequate	A1	10/15/84	Sheer Speed Water Company
37	Quail Valley	Gila	11 North	11	34	160	Inadequate	A1, A2	04/30/82	United Utilities Company
38	Quail Valley # 2	Gila	11 North	11	32	9	Inadequate	A1, A2	03/17/87	United Utilities Company
39	Ridge at Hunter Creek	Gila	11 North	13	29	19	Adequate		08/10/98	Hunter Creek Ranch Homeowners Association
40	Rim Club Cabins, Unit One	Gila	10 North	10	1	9	Inadequate	D	09/02/04	Town of Payson
41	Rim Golf Club	Gila	11 North	10	36, 1	317	Inadequate	A1	04/21/98	Town of Payson
42	Rim View Heights Estates	Gila	10 North	10	10, 11	101	Inadequate	A1, A2	03/21/88	Town of Payson
43	Settle in at Pine Meadows	Gila	11 North	12	32, 33	210	Inadequate	A1	04/06/01	Pine Meadows Domestic Water System
44	Siena Creek	Gila	11 North	10	36	25	Inadequate	A1	12/23/02	Town of Payson
45	Star Valley Vista	Gila	11 North	11	31, 32	12	Inadequate	A1, A2	03/18/87	United Utilities Company
46	Tonto Creek Shores	Gila	9 North	10	25	8	Inadequate	A1	09/09/98	United Utilities, Inc.
47	Tonto Creek Shores B	Gila	9 North	10	25	13	Inadequate	A1	09/18/00	NA
48	Tonto Rim Ranch	Gila	11 North	12	4, 9	12	Inadequate	A1	11/13/98	Tonto Creek Utility Co.
49	Tonto Village # 3	Gila & Maricopa	11 North	11.5	5, 8	NA	Adequate		07/17/78	Tonto Village Water Company
50	Walnut Springs	Gila	6 North	10	26	85	Adequate		01/06/98	United Utilities, Inc.
51	Whisper Ridge	Gila	10 North	10	2	20	Inadequate	A1	08/08/02	Town of Payson
52	Wildflower Ridge	Gila	11 North	10	35	50	Inadequate	A1	11/17/04	Town of Payson
53	Woods of Payson	Gila	11 North	10	26	8	Inadequate	A1	10/08/97	Town of Payson
54	Zane Grey Ranch	Gila	12 North	12	32	5	Inadequate	A1	08/05/93	Zane Grey Ranch Homeowners

Notes:

¹ Each determination of the adequacy of water supplies available to a subdivision is based on the information available to ADWR and the standards of review and policies in effect at the time the determination was made.

² In some cases, ADWR might make a different determination if a similar application were submitted today, based on the hydrologic data and other information currently available, as well as current rules and policies.

³ A. Physical/Continuous

- 1) Insufficient Data (applicant chose not to submit necessary information, and/or available hydrologic data insufficient to make determination)
- 2) Insufficient Supply (existing water supply unreliable or physically unavailable; for groundwater, depth-to-water exceeds criteria)
- 3) Insufficient Infrastructure (distribution system is insufficient to meet demands or applicant proposed water hauling)
- B. Legal (applicant failed to demonstrate a legal right to use the water or failed to demonstrate the provider's legal authority to serve the subdivision)
- C. Water Quality
- D. Unable to locate records
- NA = Not Available

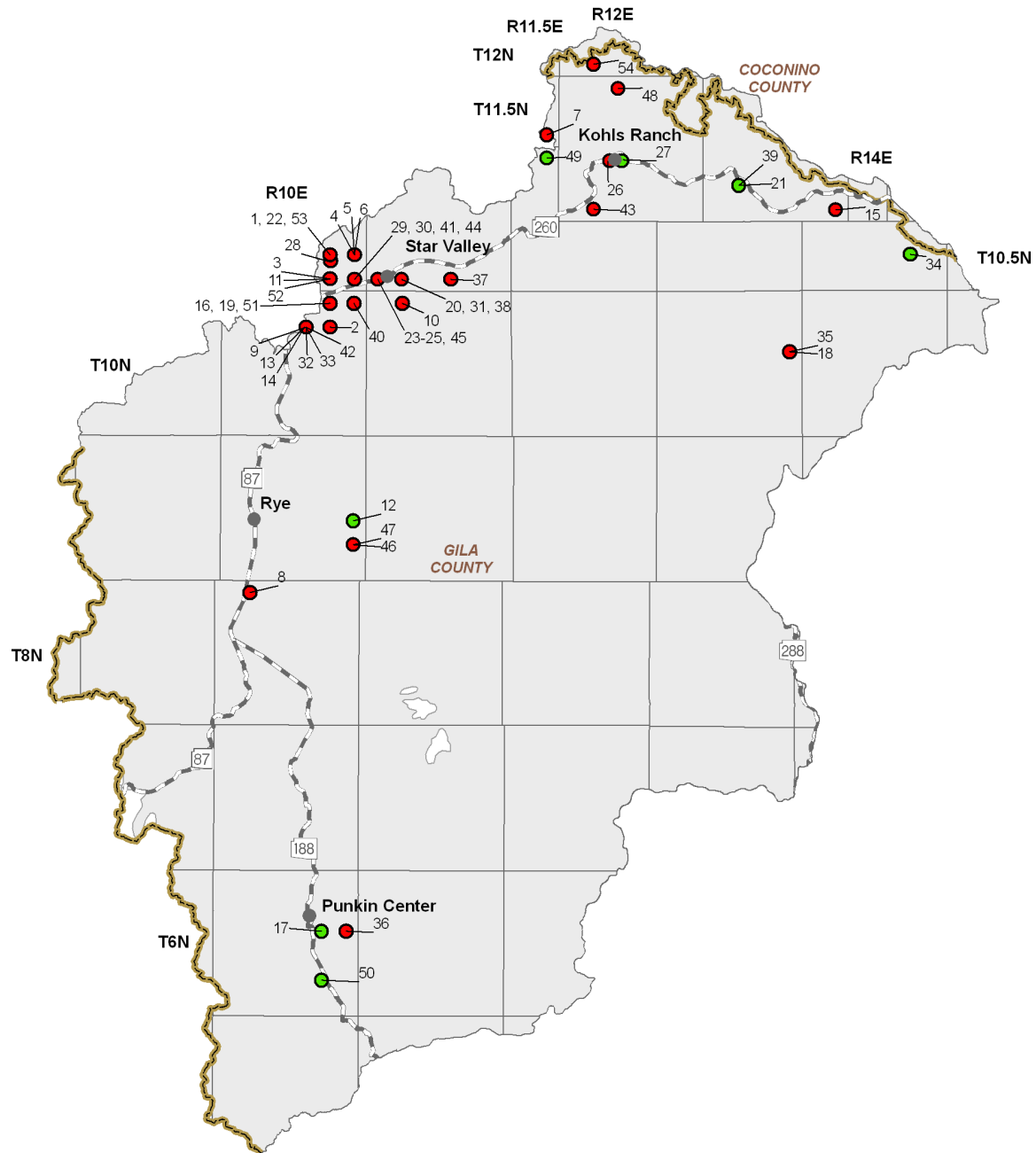


Figure 5.3-11
Tonto Creek Basin
Adequacy Determinations



Tonto Creek Basin

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